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ABSTRACT

The University of Maryland's Center for Instructional Development and Evaluation has developed interactive video material for the Navy Medical Department to teach Navy medical corpsmen appropriate response procedures for each of seven emergency medical conditions: angina pectoris, acute myocardial infarction, congestive heart failure, stroke, diabetic coma, insulin shock, and epileptic seizure. An underlying philosophy of the design team and the subject matter expert was that the student could best master the process tasks by practicing them; the properties of computer-based interactive videodisc (CBIV) make it uniquely suited to implement this instructional principle. The videodisc simulation can include both patient attributes and environmental attributes that compare realistically with actual settings. A total of 15 emergency settings were developed to account for specific variations of the seven medical conditions; since the material is to be used for evaluative as well as instructional purposes, a second set of parallel lessons was developed for each setting, making a final total of 30 lessons in the system. Background information provided for the learner includes a glossary, reference lessons, and an introduction to the hardware and software. This paper briefly describes the system design and a representative lesson. (JB)

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THE DEVELOPMENT AND USE OF INTERACTIVE VIDEODISC INSTRUCTION FOR NAVY MEDICAL CORPSMEN

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ABSTRACT

The Navy Medical Department plans to build a complete training library of interactive video and computer-based programs. As part of this effort, The University of Maryland University College's Center for Instructional Development and Evaluation has developed interactive video material to teach Navy medical corpsmen appropriate response procedures for each of seven emergency medical conditions. The instructional design, system, and lessons comprising this material will be described and demonstrated.

Presented at the 1985 Videodisc, Optical Disk, and CD-ROM Conference, Philadelphia, Pennsylvania, December 9-12, 1985.

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THE DEVELOPMENT AND USE OF INTERACTIVE VIDEODISC INSTRUCTION FOR NAVY MEDICAL CORPSMEN

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The Naval Medical Department has an ongoing commitment to seek out ways of improving the knowledge and skills of its health care providers without significantly increasing training staff or facilities. Like counterparts in the private sector, Navy Medical has for years been using linear audiovisual products to enhance curricula and increase training efficiency. These products have suffered shortcomings such as limited feedback and design options For these and other reasons, Navy Medical decided to incorporate interactive video with more traditional methods. A first initiative is intended to meet training needs in the hospital corpsman/dental technician schools. A second initiative will meet in-service training and continuing education needs at Navy hospitals and dental clinics worldwide.

Late this fall, the first initiative will be implemented with the installation of 50 carrels at five Navy school sites. Later, in 1986, more carrels will be purchased and local area networks will be created at these same sites. Concurrently carrels will be placed at selected hospitals and dental clinics.

The Navy Medical Department plans to continue adding to the carrel systems and to build a complete training library of interactive video and straight computer-assisted programs. Navy Medical intends to produce programs through inhouse resources and contractor services, and will also acquire commercial off-the-shelf products.

In November of 1983, The University of Maryland University College Center for Instructional Development and Evaluation (CIDE) was awarded a contract to develop a computer-based interactive videodisc (CBIV) instructional program for this intended library. The overall purpose of the Maryland contract is to teach Navy medical corpsmen appropriate response procedures for each of seven emergency medical conditions: (1) angina pectoris, (2) acute myocardial infarction, (3) congestive heart failure, (4) stroke, (5) diabetic coma, (6) insulin shock, and (7) epileptic seizure.

PROJECT BACKGROUND

The emergency medical conditions program is being developed to support both the initial technical training curriculum for entry level hospital corpsmen as well as to

serve as a continuing education tool for a wide variety of corpsmen serving with Navy and Marine Corps forces. The entry level corpsmen population is a fairly representative cross section of persons enlisting in the Navy today. The average age of this group is 20, with a range from 18 to 25 years. Males constitute 60% of the corpsmen entry level population, 40% are female. All but a select few are high school graduates (some waivers are granted for personnel with prior experience), and all are in the upper 50 percentile on standard vocational aptitude tests.

The lessons that are being developed through this project will support classroom instruction. As it permits student self-study, it can serve as mandatory remedial study for students with academic difficulty, and it can potentially serve as a substitute instructional system in the case of mobilization.

These lessons will also serve a continuing education function. The Navy Hospital Corps is a large and diverse group with different educational needs at different times in their careers. Regardless of technical specialty or current employment, all Navy Hospital Corpsmen are expected to be proficient in the basic emergency care skills and to possess a basic knowledge of generalized patient care. Advancements in rate for Navy corpsmen are based on a combination of performance efficiency and scores on a written examination based on generalized patient care. These lessons will help support the maintenance of knowledge necessary to ensure a large force of corpsmen capable of performing both their technical role and their contingency role.

INSTRUCTIONAL DESIGN CONSIDERATIONS

Project staff and a Navy-identified subject matter expert (SME) defined the specific content and delineated lesson objectives. A review of related information suggested three general types of skills to be accomplished upon arrival at the emergency scene. First, the corpsman must assess the patient's condition and make a preliminary diagnosis through observations and examination. Second, the corpsman must report clearly and accurately the condition of the patient to hospital-based personnel using appropriate vocabulary and a systematic procedure. Third, the corpsmen must treat the patient in accord with the transmitted instructions. These three tasks served as the general framework for educational objectives. Each of the seven emergency medical conditions is characterized by signs and symptoms that the student must recognize and/or assess during the first of the three skill steps. These comprised the content of the instruction.

An underlying philosophy of the design team and the SME was that the student could best master the process tasks by

practicing them. The properties of CBIV make it uniquely suited to implement this instructional principle. The videodisc allows the student to watch, from the medical corpsman's point of view, the development of a realistic emergency situation, and, through the computer, to participate in the assessment, reporting, and treatment of the simulated patient. The videodisc simulation can include both patient attributes and environmental attributes that are realistic with actual settings.

A total of 15 emergency settings were developed to account for specific variations of the seven medical conditions. Since the material is to be used for evaluative as well as instructive purposes, a second set of parallel lessons were developed for each of the emergency settings, comprising a final set of 30 lessons in the system. Background information available to the learner as part of the overall system includes a glossary, reference lessons, and an introduction to the hardware and courseware systems.

SYSTEM DESCRIPTION

The system design can be conceptualized as two concentric rings, where each ring consists of a series of fifteen video case studies in which the student encounters a medical emergency. The case studies are filmed from the medical corpsmen's point of view and provide a variety of realistic emergency situations. In addition to the two rings of case studies, there are reference units for each of the medical emergency conditions and a glossary.

It is anticipated that the student will not necessarily work through all of the courseware during one session. Therefore, students will be routed back to the appropriate points of instruction based on their sign-off point. For this reason, the first function of any student using the system will be to follow sign-on procedures. Following sign-on, first-time students will be presented with an overview of the objectives and purpose of the course they are about to work through. This short module includes a section describing the use of the system features and aids available to the student.

Once the student has completed the module on the system overview, a menu frame is presented. Through the menu options the student may elect to enter a reference unit or may elect to begin/continue with case studies. In the case of a first-time student, this last option will begin Ring 1. Returning students are routed to the point where they last signed off the system. Upon entering Ring 1, the student encounters the series of emergency case studies in random order. The student is required to complete all fifteen cases in Ring 1 before proceeding into the next ring. The number

of case studies to be completed in the second ring is determined by the student's performance in Ring 1. The case studies in Ring 2 are required only for those Ring 1 cases that were failed. Thus, the student who successfully completes all Ring 1 case studies will be routed out of the system with no further instruction.

If the student fails to demonstrate mastery of any Ring 2 case study, appropriate feedback will be given and the student will be directed to offline sources of information for further study. After all case studies have been completed, the student receives comprehensive feedback regarding her/his performance throughout the entire series and may elect to review the cases not already encountered.

LESSON DESCRIPTION

The following is a brief description of a lesson developed to assess the corpsman's response to an emergency situation where a patient suffers an acute myocardial infarction. This description illustrates the juxtaposition of video and computer text throughout the lessons, and is representative of all 30 lessons that have been developed.

Upon initial entry to the acute myocardial infarction (AMI) lesson, the student sees through the videodisc an ambulance arriving at a park, where a man is lying on a bench with a bystander hovering beside him. Two corpsmen jump from the ambulance and rush to the bench, where the bystander gives them a brief description of what has happened. The camera moves in to a close-up of the patient on the bench, assuming the point of view of one of the corpsmen, and allows the learner to "see" the patient clutching his chest and "hear" the patient gasping for air. The computer intervenes at this point, and asks the student to make the first process decision (conduct an airway/breathing/circulation check). If the student makes the correct decision, appropriate feedback is given; if not, instructive feedback is given. The scenario then continues on the video, with the patient briefly describing his pain. Again, the computer intervenes and asks the student to make the next process decision (begin the secondary survey). The same feedback pattern described for the first decision is repeated here and throughout the lesson: positive feedback accompanies correct answers, and instructive feedback accompanies incorrect answers. The video continues. The two corpsmen proceed to collect information about the patient's vital signs and this information is displayed to the learner. As soon as information is collected, a "Patient Record Form" developed as a brief abstraction of a more comprehensive form is sequentially completed. The learner may ask to see and review this form at any point during the lesson, but is routinely shown the form as new information is added.

Again the student is asked to define the next set of information to be acquired from the patient, which is to begin the subjective interview. The student is given a choice of 10 questions to ask the patient, and asked to select the 6 questions that will provide the most important information about the patient and the emergency. As the student "asks" each question, the patient answers the question on the videodisc. The computer then asks what should next be accomplished. The correct answer is to complete the necessary steps of a physical examination of the patient. The learner sees this examination conducted through still photographs (in order to reduce the amount of disc space that would be required if the entire examination were conducted through video format). This concludes the assessment and information gathering process.

The computer queries the student about what should occur next; the correct answer is that the corpsman should make an initial report to the hospital-based medical officer. The learner must then identify from a large grouping of symptoms those particular ones that should be included in the report to the hospital. The video begins again, as one of the two corpsmen begins to place the call or transmit the information to the hospital. The student will hear two versions of an audio report to the hospital: (1) the best transmission that includes all pertinent information and is presented in a systematic manner, and, (2) a transmission that omits critical information. The student must identify the best transmission. The student is then asked to identify which from among a set of possible instructions will be the ones most likely to be given in this instance. The video then proceeds and the student does, in fact, hear the actual instructions that the corpsman receives from the medical officer, and the video concludes with the patient being transported in accord with these instructions. As a final choice, the student is asked to identify which of the seven emergency conditions has been the subject of this lesson.

Although a specific score is not kept to describe the student's performance at the various choice points, certain choices have been identified as essential to make, and other choices have been identified as "failure" choices. If the student misses any of the essential choices during the lesson, or makes any of the failure choices, then the student will automatically have to complete the parallel version of this same lesson after all 15 lessons in the first set have been completed.

Future plans are to implement and evaluate this CBIV course. If this system proves to be effective, the Navy anticipates using comparable CBIV for other components of the Hospital Corps School curriculum.